

## WHAT IS CLAIMED:

1. An apparatus for routing content through a network based on semantics of the content being routed comprising:

a computer comprising;

at least one network interface card;

a signaling agent;

a forwarding agent;

a load manager; and

a semantic profile manager.

2. The apparatus as in claim 1 wherein

the signaling agent handles communication between the apparatus and other routing apparatus and determines the connectivity to the other routing apparatus;

the forwarding agent forwards incoming semantic packets;

the load manager manages a processing load of the routing apparatus; and

the profile manager aggregates semantic profiles.

3. The apparatus as in claim 2 wherein the semantic profiles are aggregated into ontological trees that are used to form routing tables.
4. The apparatus as in claim 3 wherein the load manager manages the processing load of the routing apparatus by reducing precision in the aggregated semantic profiles.
5. The apparatus as in claim 3 wherein the signaling agent sends the aggregated semantic profiles to the other routing apparatus to update the routing data of the other routing apparatus.
6. The apparatus as in claim 1 wherein the profile manager, the load manager and the signaling agent interact to balance processing load of the routing apparatus.
7. The apparatus as in claim 1 wherein the load manager manages processing load partly by delegating the processing load of the routing apparatus to neighboring routing apparatus.
8. The apparatus as in claim 1 wherein the load manager interacts with other routing apparatus and a semantic log keeper to become aware of current topology of the network.
9. The apparatus as in claim 1 wherein the forwarding agent is composed of a routing cache and routing data.
10. The apparatus as in claim 9 wherein the forwarding agent routes incoming semantic packets to their destination by using information included in the routing cache.
11. The apparatus as in claim 10 wherein the forwarding agent analyzes the semantic description of the semantic packet to determine the destination of the semantic packet.
12. A method for routing content through a network based on semantics of the content being routed comprising the steps of:
- receiving a semantic profile;
  - aggregating the semantic profile with other semantic profiles;
  - receiving a semantic packet; and

routing the semantic packet to a destination based on a comparison between the content included in the semantic packet and the aggregated semantic profiles.

13. The method as in claim 12 further comprising classifying the content before creating the semantic packet.
14. The method as in claim 12 further comprising filtering the routed semantic packet before reaching a content consumer.
15. The method as in claim 12 wherein the semantic packet comprises a header and content.
16. The method as in claim 15 wherein the header is in a networking community programming language.
17. The method as in claim 15 wherein the header is in XML markup language.
18. The method as in claim 15 wherein the header of the semantic packet comprises a preamble, at least one semantic signature, and at least one semantic descriptor.
19. The method as in claim 18 wherein the semantic descriptors of the semantic packet further comprises environment specific information.
20. The method as in claim 18 wherein the semantic descriptors of the semantic packet further comprises customized information.
21. The method as in claim 18 further comprising a forwarding agent which routes the semantic packet through the network using the semantic signature.
22. The method as in claim 12 wherein said method is deployed as an overlay network on top of conventional network routers.
23. The method as in claim 22 further comprising sending semantic packets through the network routers by tunneling.
24. The method as in claim 12 wherein the semantic profile expresses a content consumer's interest.
25. The method as in claim 12 wherein content is only forwarded to a content consumer if the content matches a content consumer's interest as specified in the semantic profile.
26. The method as in claim 25 wherein the matching of content to semantic profile is done by comparing structured XML packet headers and content routing trees.
27. The method as in claim 12 wherein the semantic profile comprises:  
a preamble;

at least one profile signature;  
at least one profile descriptor;  
information about a lifetime of the semantic profile;  
authentication data; and  
a command field that instructs a semantic router.

28. The method as in claim 27 wherein the preamble of the semantic profile includes at least one semantic descriptor.

29. The method as in claim 27 wherein the profile descriptor is in a networking community programming language.

30. The method as in claim 27 wherein the profile descriptor is in XML markup language.

31. The method as in claim 27 wherein the authentication data is used to verify a user.

32. The method as in claim 27 wherein the semantic profile further comprises information that allows the semantic network to act as a firewall by controlling who has access to content.

33. The method as in claim 27 further comprising a policy profile that allows the network to determine content received by a content consumer.

34. The method as in claim 12 wherein the step of aggregating the semantic profile comprises the steps of

- parsing a profile file;
- creating and populating a node for a profile tree on every information element in the profile file;
- creating a fact associated with the node;
- reading in a rule file, wherein rules are written to compare name, value, parent, label and children of the node;
- running a rule engine which will fire the rules based on the facts;
- calling a corresponding method that transforms at least one node in the profile tree when the fact fires and
- attaching methods on subtrees for transformations.

35. The method of claim 34 where the facts and rules are represented in Jess system and the methods are represented in Java programming language.

36. A method for connecting a client to a semantic network comprising:  
contacting a semantic log keeper;

using routing data obtained from the semantic log keeper to query different semantic routers; and  
selecting suitable semantic routers based on responses to queries.

37. The method as in claim 36 further comprising the step of the selected semantic routers receiving a semantic profile from content consumers.

38. The method as in claim 36 further comprising the step of the selected routers receiving a semantic packet from content producers.

39. A method for announcing content comprising:

receiving a content profile;

aggregating the content profile with other content profiles;

distributing the aggregated content profiles into a semantic network;

storing the aggregated content profiles at semantic routers within the semantic network;

receiving seek packets; and

routing the seek packets based in part on the aggregated content profiles stored at semantic routers.

40. The method as in claim 39 wherein said seek packets includes a return address.

41. The method as in claim 39 further comprising the step of pushing content to content consumers..

42. A semantic router comprising:

a profile manager that aggregates semantic profiles; and

a forwarding agent that forwards semantic packets to neighboring semantic router based on the aggregated semantic profiles.

43. A multiprotocol router comprising:

a routing engine;

a network routing engine; and

a semantic packet routing engine.

44. An apparatus for routing content through a network having:

at least one semantic router, each semantic router connected to a network

comprising:

means for receiving a semantic packet;

means for receiving a semantic profile;

means for aggregating the semantic profile with other semantic profiles;

means for routing content based on the aggregated semantic profiles to at

least a next destination.

45. An article of manufacture comprising a computer readable medium that stores computer executable instructions for causing a computer system to:

receive a semantic profile;

aggregate the semantic profile with other semantic profiles;

receive semantic packets; and

use the aggregated semantic profiles to route the received semantic packets

through a network to at least a next destination address.

46. A method for an online search engine in a distributed computer network comprising the steps of:

receiving an interest in specified content;

creating a semantic profile comprising said interest in specified content;

propagating the semantic profile to a semantic router;

aggregating the semantic profile with other semantic profiles on at least one semantic router;

propagating the aggregated semantic profiles through a network;

receiving a semantic packet; and

propagating the semantic packet through the network towards the search engine based on the aggregated semantic profiles.

47. A computer-implemented method of retrieving information comprising the following steps:

receiving a semantic profile;

aggregating the semantic profile with other semantic profiles;

receiving semantic packets; and

routing the semantic packet to a destination based on a comparison between the content contained in the semantic packet and the aggregated semantic profiles.

48. A scalable semantic network comprising:

a plurality of semantic routers distributed among the nodes of the semantic network,

wherein each of the plurality of semantic routers having a plurality of ports, said ports having other semantic routers connected thereto,

wherein a message is received by a current semantic router via one semantic router via one of said plurality of ports and sent along a preferred route to a next semantic routers via at least one of said plurality of ports;

wherein each semantic router comprises ontological trees that determine the next semantic routers to which to route a message based on the content of the message; and

wherein the ontological trees are based on an aggregation of semantic profiles.